IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Kwang Ki Choi	)
	) Group Art Unit: 2828
SERIAL NO.: 10/823,653	)
	) Examiner: Rodrigues
FILED: April 14, 2004	) Armando
	)
FOR: SEMICONDUCTOR LASER DEVICE	) Conf. No. 4964

RESPONSE

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is a response to the decision from the Board of Patents Appeals and Interferences. Enclosed herewith is a Request for Continuing Examination.

IN THE CLAIMS

1. (Currently Amended) A semiconductor laser device, which includes a multi-semiconductor material layered mesa structure having a laser resonance layer on a substrate and cladding layers formed over and below the resonance layer, comprising:

rounded corners connected to the substrate, in a lower portion of the mesa structure and configured to prevent concentration of a scribing force;

a current injection ridge formed on an upper portion of the mesa structure and protruding from an upper surface of the mesa structure; and

a passivation layer formed on the mesa structure and having a contact hole exposing an upper surface of the current injection ridge, wherein the upper and the lower cladding layers are a p-GaN/AlGaN layer and an n-GaN/AlGaN layer, respectively.

2. (Canceled)

3. (Currently Amended) A semiconductor laser device, which includes a multi-semiconductor material layered mesa structure having a laser resonance layer on a substrate and cladding layers formed over and below the resonance layer, comprising:

rounded corners connected to the substrate, in a lower portion of the mesa structure and configured to prevent concentration of a scribing force;

a current injection ridge formed on an upper portion of the mesa structure and protruding from an upper surface of the mesa structure; and

a passivation layer formed on the mesa structure and having a contact hole exposing an upper surface of the current injection ridge, wherein the upper and the lower cladding layers are a p-GaN/AlGaN layer and an n-GaN/AlGaN layer, respectively; ~~The semiconductor laser device of claim 1,~~ wherein the resonance layer includes: a lower wave guide layer stacked on the lower cladding layer and having a greater refractive index than the lower cladding layer;

an active layer stacked on the lower wave guide layer that generates a laser beam; and an upper wave guide layer stacked on the active layer.

4. (Previously Presented) The semiconductor laser device of claim 3, where the refractive indexes of the upper and the lower wave guide layers are less than the refractive index of

the active layer and the upper and lower wave guide layers are GaN based group III-V compound semiconductor layers.

5. (Previously Presented) The semiconductor laser device of claim 3, wherein the active layer is a semiconductor layer made of a GaN based group III-V nitride compound expressed as $In_xAl_yGa_{1-x-y}N$ where $0 \leqq x \leqq 1$, $0 \leqq y \leqq 1$, and $x+y \leqq 1$.

6. (Previously Presented) The semiconductor laser device of claim 3, wherein the ridge is formed on the upper cladding layer, and a second compound semiconductor layer is formed on the current injection ridge.

7. (Previously Presented) The semiconductor laser device of claim 6, wherein the second compound semiconductor layer is a p-GaN based group III-V nitride semiconductor layer.

8. (Previously Presented)The semiconductor laser device of claim 3, wherein the substrate further includes an n-type electrode on the upper surface, and the substrate is a sapphire substrate having a gallium nitride (GaN) semiconductor material layer or a freestanding GaN substrate.

9. (Currently Amended) A semiconductor laser device, which includes a multi-semiconductor material layered mesa structure having a laser resonance layer on a substrate and cladding layers formed above and below the resonance layer, comprising:

rounded corners connected to the substrate, in a lower portion of the mesa structure and configured to prevent concentration of a scribing force;

a current injection ridge and force distribution ridges formed on an upper portion of the mesa structure and protruding from an upper surface of the mesa structure; and

a passivation layer formed on the mesa structure and having a contact hole exposing an upper surface of the current injection ridge, wherein the upper and the lower cladding layers are a p-GaN/AlGaN layer and an n-GaN/AlGaN layer, respectively.

10. (Canceled)

11. (Currently Amended) A semiconductor laser device, which includes a multi-semiconductor material layered mesa structure having a laser resonance layer on a substrate and cladding layers formed over and below the resonance layer, comprising:

rounded corners connected to the substrate, in a lower portion of the mesa structure and configured to prevent concentration of a scribing force;

a current injection ridge formed on an upper portion of the mesa structure and protruding from an upper surface of the mesa structure; and

a passivation layer formed on the mesa structure and having a contact hole exposing an upper surface of the current injection ridge, wherein the upper and the lower cladding layers are a p-GaN/AlGaN layer and an n-GaN/AlGaN layer, respectively~~The semiconductor laser device of claim 9~~, wherein the resonance layer includes:

a lower wave guide layer stacked on the lower cladding layer and having a greater refractive index than the lower cladding layer;

an active layer stacked on the lower wave guide layer that generates a laser beam; and an upper wave guide layer stacked on the active layer.

12. (Previously Presented) The semiconductor laser device of claim 11, where the refractive indexes of the upper and the lower wave guide layers are less than the

refractive index of the active layer and the upper and the lower wave guide layers are GaN based group III-V compound semiconductor layers.

13. (Previously Presented) The semiconductor laser device of claim 11, wherein the active layer is a semiconductor layer made of a GaN based group II-V nitride compound expressed as $In_xAl_yGa_{1-x-y}N$ where $0 \leqq x \leqq 1$, $0 \leqq y \leqq 1$, and $x+y \leqq 1$.

14. (Original) The semiconductor laser device of claim 11, wherein the ridges are formed on the upper cladding layer, and a second compound semiconductor layer is formed on the central ridge.

15. (Original) The semiconductor laser device of claim 14, wherein the second compound semiconductor layer is a p-GaN based group III-V nitride semiconductor layer.

16. (Previously Presented) The semiconductor laser device of claim 11, wherein the substrate further includes an n-type electrode on the upper surface, and the substrate is a sapphire substrate having a GaN semiconductor material layer or a freestanding GaN substrate.

REMARKS

Claims 1 – 16 are pending in the present application. Claims 2 and 10 are canceled. Claims 1, 3, 9 and 11 are amended, leaving Claims 1, 3 – 9 and 12 – 16 for consideration upon entry of the present amendment.

Claims 1 and 9 are amended to incorporate the subject matter of Claims 2 and 10 respectively. Claims 3 and 11 are amended by incorporating the limitations of Claim 1 and Claim 9 respectively into these.

Claims Rejected Under 35 U.S.C. § 102(b)

Claims 1 and 9 are rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Nakamura (U.S. Patent No. 6,798,807).

To anticipate a claim under 35 U.S.C. § 102, a single source must contain all of the elements of the claim. *Lewmar Marine Inc. v. Barient, Inc.*, 827 F.2d 744, 747, 3 U.S.P.Q.2d 1766, 1768 (Fed. Cir. 1987), *cert. denied*, 484 U.S. 1007 (1988).

Claim 1 as presently amended is directed to a semiconductor laser device, which includes a multi-semiconductor material layered mesa structure having a laser resonance layer on a substrate and cladding layers formed over and below the resonance layer, comprising rounded corners connected to the substrate, in a lower portion of the mesa structure and configured to prevent concentration of a scribing force; a current injection ridge formed on an upper portion of the mesa structure and protruding from an upper surface of the mesa structure; and a passivation layer formed on the mesa structure and having a contact hole exposing an upper surface of the current injection ridge, wherein the upper and the lower cladding layers are a p-GaN/AlGaN layer and an n-GaN/AlGaN layer, respectively.

Claim 3 as presently amended is directed to a semiconductor laser device, which includes a multi-semiconductor material layered mesa structure having a laser resonance layer on a substrate and cladding layers formed over and below the resonance layer, comprising rounded corners connected to the substrate, in a lower portion of the mesa structure and configured to prevent concentration of a scribing force; a current injection ridge formed on an upper portion of the mesa structure and protruding from an upper surface of the mesa structure; and a passivation layer formed on the mesa structure and

having a contact hole exposing an upper surface of the current injection ridge, wherein the upper and the lower cladding layers are a p-GaN/AlGaN layer and an n-GaN/AlGaN layer, respectively; wherein the resonance layer includes a lower wave guide layer stacked on the lower cladding layer and having a greater refractive index than the lower cladding layer; an active layer stacked on the lower wave guide layer that generates a laser beam; and an upper wave guide layer stacked on the active layer.

Claim 9 is directed to a semiconductor laser device, which includes a multi-semiconductor material layered mesa structure having a laser resonance layer on a substrate and cladding layers formed above and below the resonance layer, comprising rounded corners connected to the substrate, in a lower portion of the mesa structure and configured to prevent concentration of a scribing force; a current injection ridge and force distribution ridges formed on an upper portion of the mesa structure and protruding from an upper surface of the mesa structure; and a passivation layer formed on the mesa structure and having a contact hole exposing an upper surface of the current injection ridge, wherein the upper and the lower cladding layers are a p-GaN/AlGaN layer and an n-GaN/AlGaN layer, respectively.

Claim 11 is directed to a semiconductor laser device, which includes a multi-semiconductor material layered mesa structure having a laser resonance layer on a substrate and cladding layers formed over and below the resonance layer, comprising rounded corners connected to the substrate, in a lower portion of the mesa structure and configured to prevent concentration of a scribing force; a current injection ridge formed on an upper portion of the mesa structure and protruding from an upper surface of the mesa structure; and a passivation layer formed on the mesa structure and having a contact hole exposing an upper surface of the current injection ridge, wherein the upper and the lower cladding layers are a p-GaN/AlGaN layer and an n-GaN/AlGaN layer, respectively, wherein the resonance layer includes a lower wave guide layer stacked on the lower cladding layer and having a greater refractive index than the lower cladding layer; an active layer stacked on the lower wave guide layer that generates a laser beam; and an upper wave guide layer stacked on the active layer.

Nakamura teaches a semiconductor (laser) that comprises a multilayered growth layer which is electrically isolated from a substrate and includes an active layer between a

lower semiconductor layer of first conductivity type and an upper semiconductor layer of second conductivity type. (See Abstract) A ridge is formed on the surface of the multilayer without reaching the active layer, and an insulating film is formed on the substrate main surface except for the ridge upper surface. (See Abstract)

Nakamura does not teach upper and the lower cladding layers that are p-GaN/AlGaN layers and n-GaN/AlGaN layers, respectively as claimed in Claims 1 and 9 respectively.

Nakamura also does not teach a resonance layer includes a lower wave guide layer stacked on the lower cladding layer and having a greater refractive index than the lower cladding layer and an active layer stacked on the lower wave guide layer that generates a laser beam with and an upper wave guide layer stacked on the active layer as Claims 3 and 11.

Since Nakamura does not teach all elements of the claimed invention, the Applicants believe that it cannot anticipate the claimed invention. The Applicants respectfully request a withdrawal of the anticipation rejection and an allowance of the claims.

Conclusion

For at least the reasons given above, it is respectfully submitted that the foregoing remarks fully comply with the Office Action and that the claims herein are allowable over the prior art of record. Accordingly, reconsideration and allowance are requested.

If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130.

Respectfully submitted,

Date: September 29, 2010
Cantor Colburn LLP
20 Church Street
22nd Floor,
Hartford, CT 06103

/David E. Rodrigues/
David E. Rodrigues
Registration Number 50,604